

ISS0031 Modeling and Identification

Exercises for Lecture 4

Solve the following linear programming problem by Simplex method.

1:

$$z = 10x_1 - 2x_2 + x_3 \rightarrow \max$$

$$x_1 - x_3 \leq 10$$

$$x_2 + 5x_3 \leq 5$$

$$2x_1 + 5x_2 + 3x_3 \leq 50$$

$$x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$$

2:

$$z = 4x_1 + x_2 - 2x_3 \rightarrow \max$$

$$2x_1 - x_2 + x_3 \leq 1$$

$$-x_2 + 5x_3 \leq 5$$

$$5x_1 + 15x_2 - 3x_3 \leq 30$$

$$x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$$

3:

$$z = x_1 + 5x_2 + 2x_3 + 9x_4 \rightarrow \max$$

$$5x_1 - x_4 \leq 10$$

$$x_2 + 5x_3 + x_4 \leq 30$$

$$x_3 \leq 10$$

$$x_1 \geq 0, x_2 \geq 0, x_3 \geq 0, x_4 \geq 0$$

Answers to problems

1. $z_{\max}(x) = 111, x = (11, 0, 1).$

2. $z_{\max}(x) = \frac{47}{7}, x = (\frac{9}{7}, \frac{11}{7}, 0).$

3. $z_{\max}(x) = 278, x = (8, 0, 0, 30).$